

REMARKS

The Office Action dated May 13, 2009 has been carefully considered. Claims 1-5 have been amended. New claims 6-9 have been added. Claims 1-9 are in this application. Support for new claims 6-8 can be found throughout the specification and in particular at page 6, line 12 to page 7, line 17. Claim 9 includes limitations of original claim 3. No new matter has been entered.

The previously presented claims were rejected under 35 U.S.C. § 103 as obvious in view of U.S. Patent Application Publication No. 2001/003397 to Zhao et al in combination with U.S. Patent No. 6,132,904 to Kamino et al.

As described on page 4, line 4, page 4, line 26, the present invention relates to a sodium/sulfur battery comprising a solid negative electrode of sodium, a solid positive electrode of sulfur and a liquid electrolyte that operates at normal temperature and has excellent charge and discharge property. Amended claim 1 recites a liquid electrolyte comprising a glyme solvent which is disclosed neither by Zhao et al. nor Kamino et al.

Zhao et al. disclose a positive electrode comprising carbon and sulfur. The positive electrode disclosed in Zhao et al. comprise a carbon polysulfide CS compound having carbon and sulfur (see ¶¶ [0005] and [0008]), which is generated by chemical bonding of carbon and sulfur. Accordingly, the CS compound in Zhao et al. is distinct from the sulfur used for the solid positive electrode in amended claim 1 in terms of its chemical characteristics. Referring to new claims 6 and 8 of the present invention, the sulfur electrode can comprise sulfur and carbon, and the sulfur and the carbon are mixed in the sulfur electrode while maintaining their own chemical characteristics. Thus, the solid sulfur electrode of the present invention is distinct from the CS compound in Zhao et al., and the positive electrode disclosed in Zhao et al. differs from that of the sulfur electrode disclosed in amended claim 1. In particular, referring to comparative examples 1 and 2 of Zhao et al., even if the same organic sulfur compound (the CS compound) is used, the effect turns out to be different. Accordingly, there is no teaching or suggestion in Zhao et al. of the configuration of the solid sulfur electrode of the present invention from the teachings of that an electrode using an organic sulfur compound as disclosed in Zhao et al.

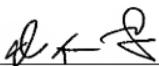
Further, Zhao et al. also disclose that alkali metals, such as lithium and sodium, may be used for the negative electrode (see ¶ [0059]), and that a porous metal body may be formed when the negative electrode is composed of such metals (see ¶ [0060]). However, Zhao et al. do not teach or suggest that the negative electrode including sodium can be composed in a solid form. Metal negative electrode batteries, such as a lithium electrode battery which operates using solid lithium at a normal temperature, and a lead electrode battery which operates using solid lead at a normal temperature, are well-known technical features in the related art. A sodium electrode battery which operates using liquid sodium at more than 300 °C is also a well-known technical feature in the related art. However, there is no teaching or suggestion in Zhao et al. or the related art of a battery using a sodium negative electrode in a solid form.

Kamino et al. disclose a polyelectrolytic battery including a polyelectrolytic film composed of a high polymer impregnated with lithium salt and a solvent in which the polyelectrolytic film is interposed between the positive and negative electrodes. The negative electrode includes a carbon material. The positive electrode can be formed of a powder of lithium containing cobalt dioxide.

In contrast to the invention defined by the present claims, Kamino et al. do not teach or suggest a sodium/sulfur battery comprising a solid negative electrode comprising sodium, a solid positive electrode comprising sulfur, and a liquid electrolyte comprising a glyme solvent including a sodium salt. The battery composition of Kamino et al. is unrelated to the invention defined by the present claims. Accordingly, Kamino et al. do not cure the deficiencies of Zhao et al. noted above and the invention defined by the present claims is not obvious in view of Zhao et al. alone or in combination with Kamino et al.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,


Diane Dunn McKay, Esq.
Reg. No. 34,586
Attorney for Applicant

PORZIO, BROMBERG & NEWMAN, P.C.
29 Thanet Road, Suite 201
Princeton, NJ 08540
Tel: 609 924 8555
Fax: 609 924 3036